Status of the D*lv q/p Analysis

Overview:

Martino, 10/20/2009

Delay due to Analysis Bias on q/p (~0.006 in the MC with no CPV):

• Bug in the PDF(cos Θ_{K-l}) for the B^0 BKG muon sample (50% of the effect);

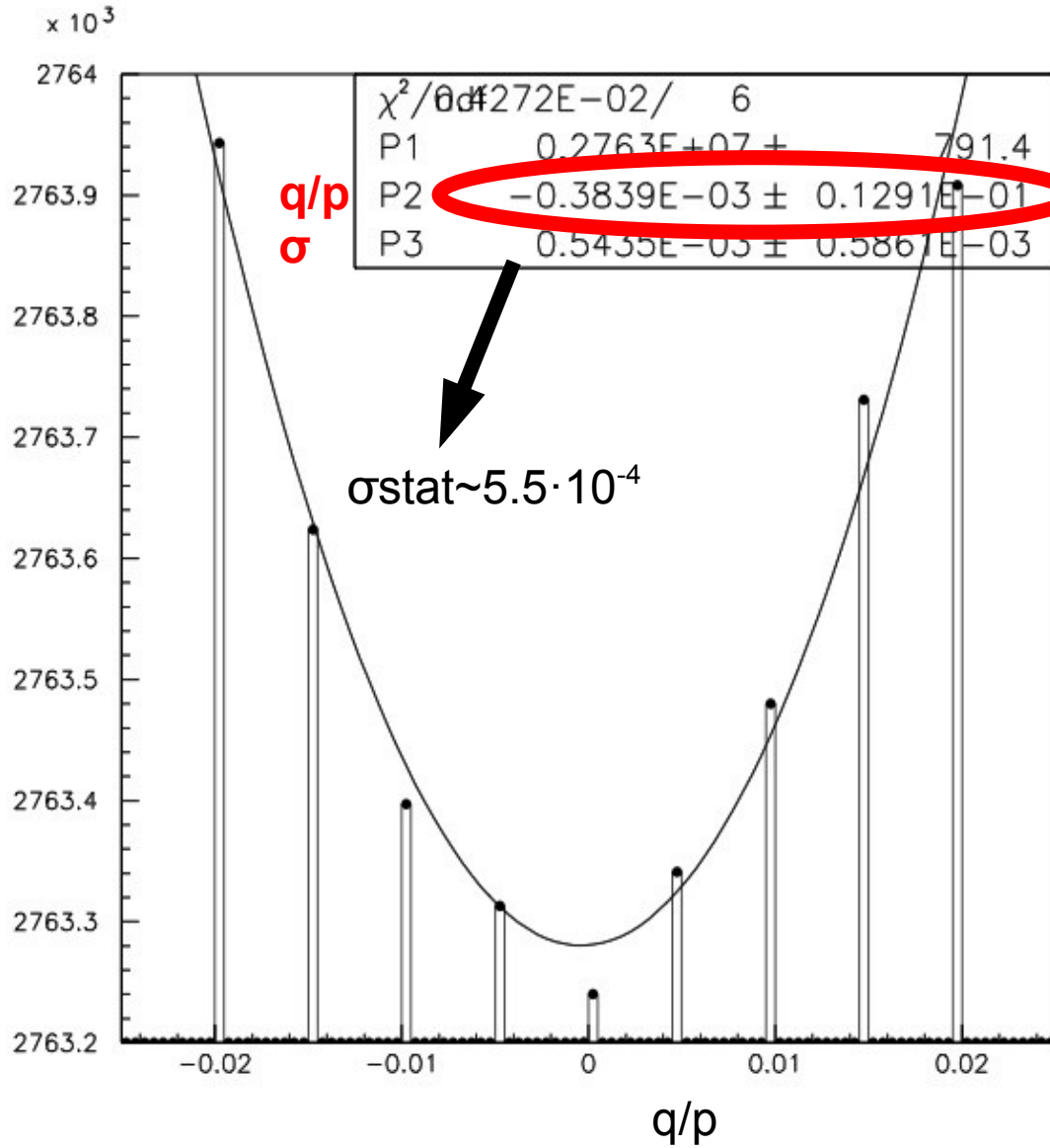• Bug in the independent fit of the various sub-samples fractions vs $m^2 v$ (50% of the effect);

Problem solved by:

• Reco-Asymmetry determination improved by using also the untagged event sample;

• Bug in the muon PDF removed;

• Use of **integrated numbers of events** for the different categories (B^0/B^+ vs Peaking/BKG vs Mixed/Unmixed vs e/µ vs K^+/K^-/Tag+Untag).

(Provisional cure!! Fractions had to be re-computed...)

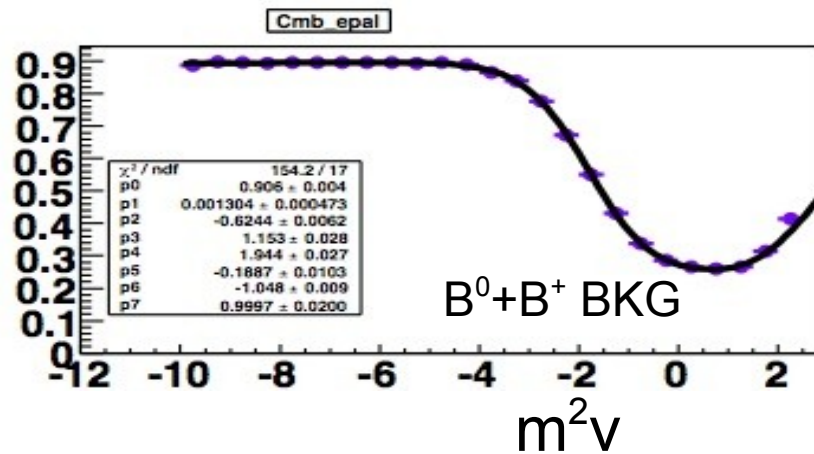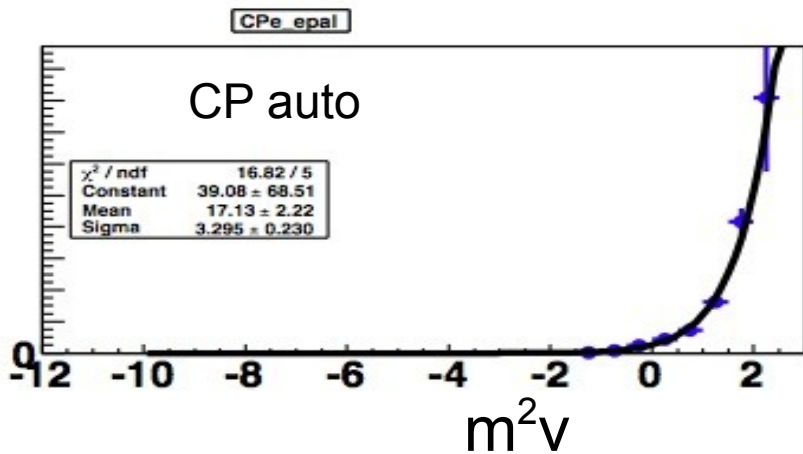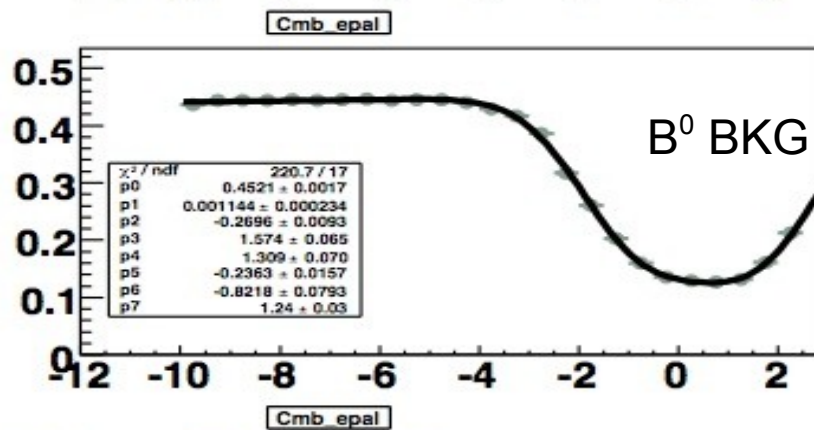# Full MC Fit (B⁰+B⁺+Continuum):

Best Likelihood vs q/p

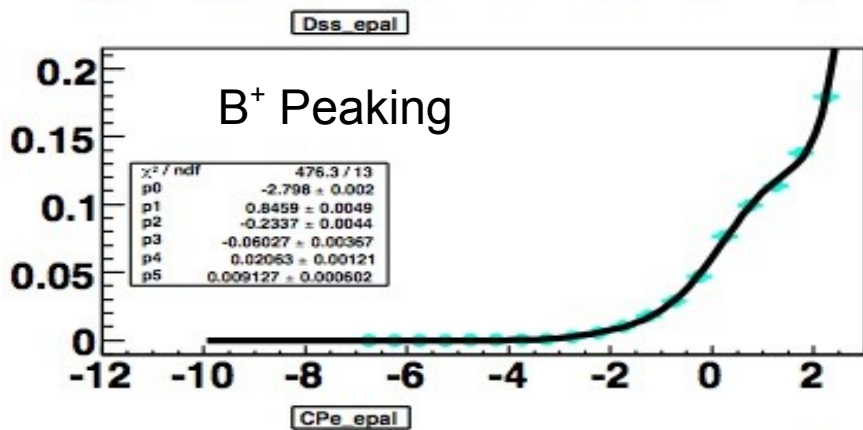χ^2/ndf 272E-02/ 6

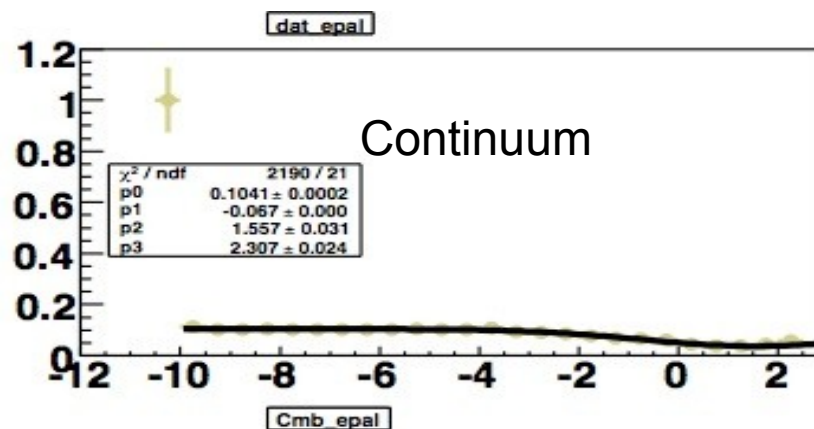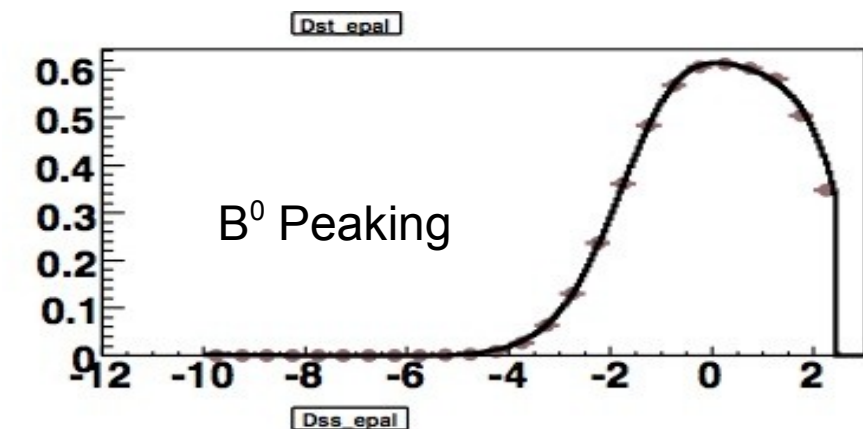|			
	P1	0.2763E+07 ±	791.4
q/p	P2	−0.3839E−03 ±	0.1291E−01
σ	P3	0.5435E−03 ±	0.5867E−03

σstat~5.5·10⁻⁴

•Bias completely removed from the Full MC Fit **(q/p<σ)**

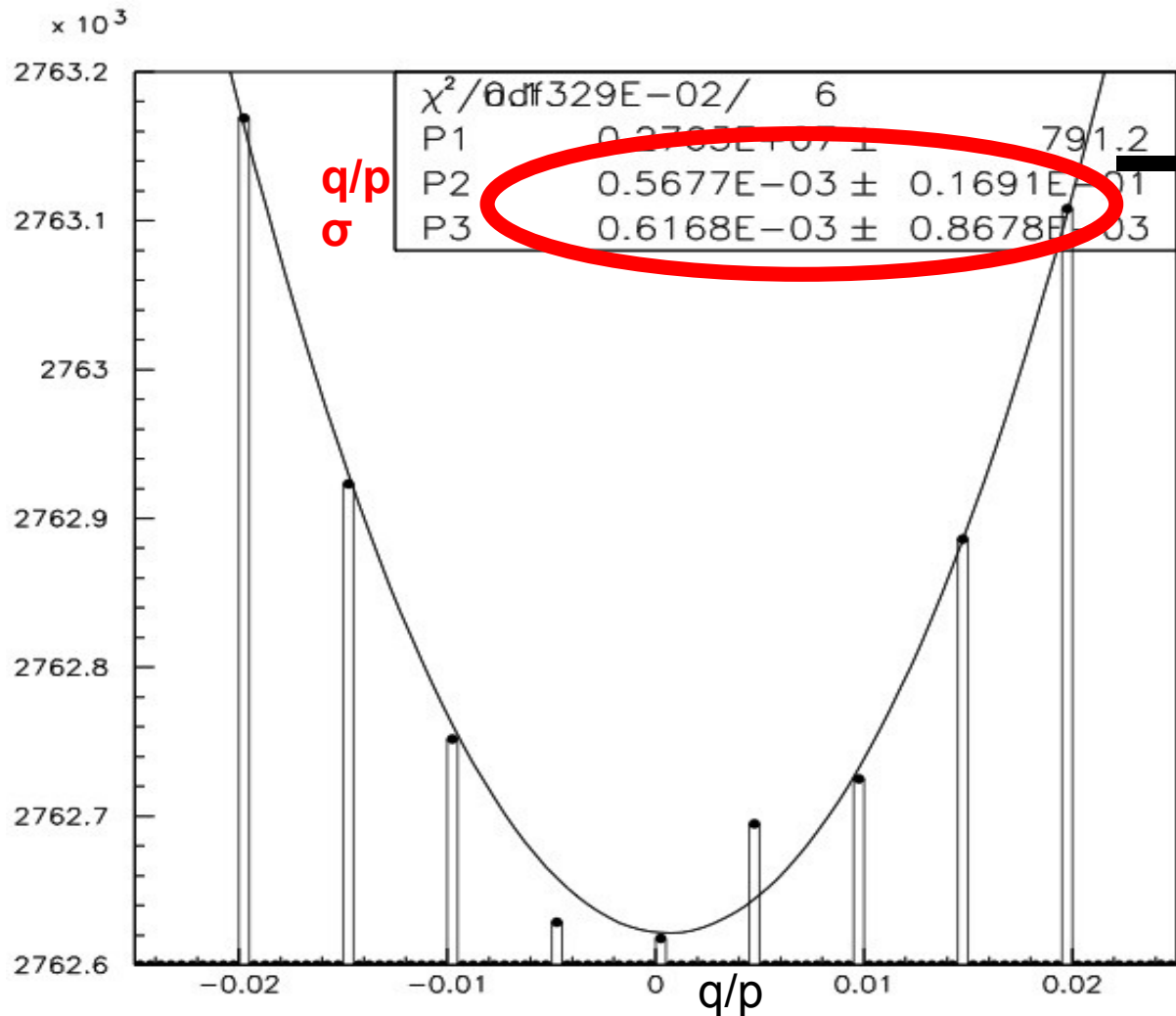•D-tagged event fraction **floated** for all the samples (B⁰/B⁺ vs Peaking/BKG).

NEWS:

1) New independent fit of the various sub-samples fractions vs m²v.
One set for each category (e/µ vs +/- vs K^+/K^-/Tag+Untag): 12 fits.

New Result:
Full MC Fit (B^0+B$^+$+Continuum)

• New Fractions F(m^2v) for the **Tagged** event samples & Integrated number of events for the **Tagged+Untagged** event samples:

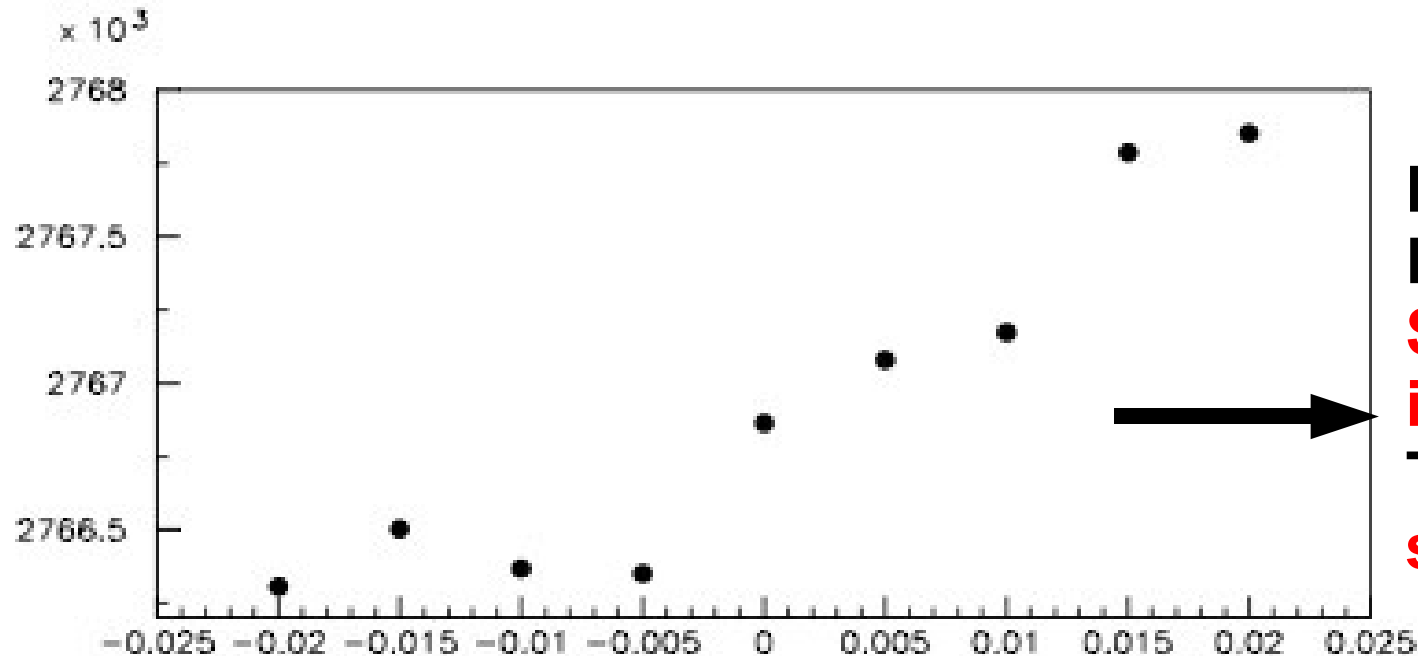|			
χ^2/0dif	329E−02/	6	
P1	0.2703E+07 ±		791.2
q/p P2	0.5677E−03 ±	0.1691E−01	
σ P3	0.6168E−03 ±	0.8678E−03	

Fitted q/p < 1 σstat:
Still No Bias

New Fractions F(m^2v) for the Tagged event samples are OK.

New Result:
Full MC Fit (B^0+B$^+$+Continuum)

•New Fractions F(m^{2}v) for the **Tagged+Untagged** event samples & Integrated number of events for the **Tagged** event samples:

BAD Log-Likelihood Profile:
Still problem in the independent fit of Tag+Untag sub-samples fractions.

Problem due to two (already discovered) bugs :
1)Bug discovered in the determination of the amount of Continuum to be added to the BB MC;
2)Sum of events in the various m^{2}v bins does not match the total statistics.

A few days needed to reproduce the Tag+Untag sample fractions.

2) Strategy definition for the treatment of the B^0 Lifetime & Mixing in the Fit

- "Standard" approach: float τ_{B0} and Δm in the fit. Gives highly biased results ($\tau_{B0} \sim$ 1.62 ps, $\Delta m \sim 0.508$ ps^{-1});

- Check for any correlations with q/p by fixing τ_{B0}, Δm to the simulation values (τ_{B0} =1.54 ps, Δm=0.489 ps^{-1}) [standard fit];
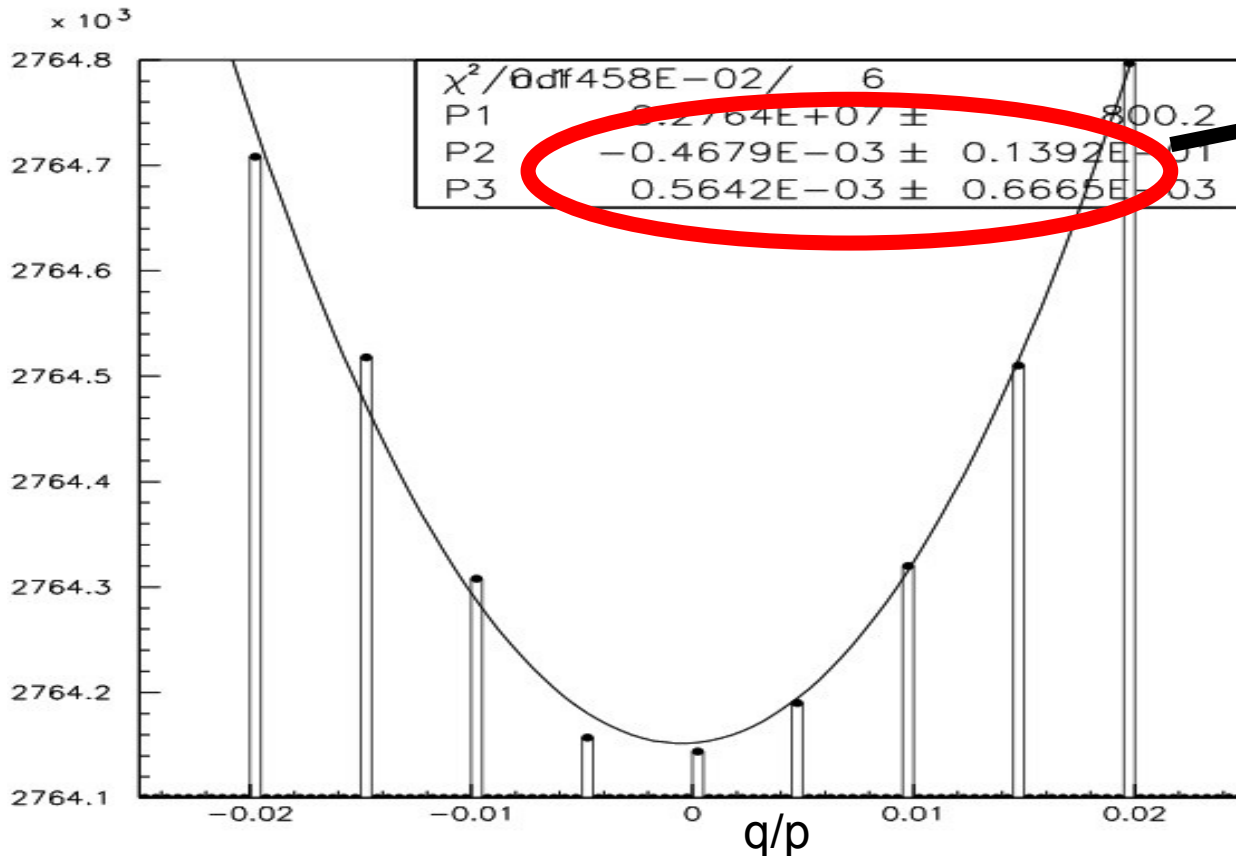
Fitted q/p < 1 σstat:
Still No Bias

Comparison w.r.t. Floated parameters:

$\delta(q/p) = -9 \cdot 10^{-5}$
Very stable result

Conclusions

- Signal/BKG fractions vs m^2v almost finalized (a few days needed for the Tag+Untag event sample refitting);

- Check of the Fit stability vs B^0 Lifetime and Mixing;

Next Steps

- Full MC result in a few days;

- Toy MC Validation (Enrico at work);

- BAD release;

- Fit on Data and Systematics.